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QUARTERLY

# TECHNICAL STANDARDS

# Digest

VOL. I NO.1

REA

U.S.D.A.

WASHINGTON 25, D.C.

MAY 1949

## ABOUT THE DIGEST

This summary of activities of the Technical Standards Division has been prepared for the information of field and headquarters personnel and we hope it will prove of value to them. Similarly, REA personnel, particularly field personnel, can assist us by including in their field reports items which may be useful in the projects undertaken by the Technical Standards Division. This initial issue of the digest presents some highlights in the operations of the Division for the period of nine months from July 1, 1948 through March 31, 1949.

## MAJOR PROJECTS COMPLETED AND UNDERWAY

Brush Control: With the cooperation of a number of rural electric power systems, right-of-way clearing tests, utilizing the 2,4-D brush killer and other chemicals, were conducted. The interim report has been completed and will be ready for release in the near future. This report will summarize the information obtained to date and provide a guide for additional tests.

Electric Power Utilization On Farms: Studies were made to evaluate the future electric power needs of rural people in selected areas. A detailed report on the studies has been completed and is being reviewed. The basic information for this report came from an analysis of REA economic field appraisals in 114 areas which were made during 1947 and the early part of 1948.

Electric Water Heater Control: The entire report on control of water heaters has been finished and will be available for distribution as soon as the printing has been completed.

Electric Water Heater Study: A project consisting of the compilation and analysis of data on 550 water heater installations in Ohio has been underway. This case study will provide information on the water heater requirements of selected consumers and the energy consumption of electric water heaters for these farm and non-farm domestic consumers by months, seasons and years. An interim report was issued in February 1949. The final report will be ready by June 30, 1949.

Equipment Performance: A study is being made to determine a method whereby we can assist borrowers in reducing frequency of line outages and in obtaining better equipment and longer life from existing equipment. Line outage and equipment

performance reports will be utilized in ascertaining this method.

Fault Locator: The investigation of the Eltron Fault Locator has been completed and the report has been distributed.

Gripflex Ties: The performance of Gripflex insulator ties as compared with hand-wrapped ties is being studied. Comments by field personnel concerning the performance of these types of ties would be welcome indeed.

Meter Maintenance Manual: Information is being collected for a maintenance and calibration manual for the servicing of watthour meters.

Multi-Grounded Y Distribution Systems, 13.8/23.9 kv: A study is in process to determine to what extent various equipment with basic insulation level of 15 kv can be used on such systems and what the limitations are, if any. We ask for and earnestly seek the assistance of field engineers in this problem and other technical problems.

Outage Monitor: Tests are being conducted on a new outage monitoring and reporting system. Experimental equipment is being utilized now on the lines of Virginia 29 Nelson at Lovingston.

Transformer Size Requirements: A study, nationwide in its scope, has been made which deals with needs of REA borrowers for 1-1/2 kva and 7-1/2 kva transformers. A report which graphically depicts the results of this study will be issued soon.

Series Capacitors As Voltage Regulators: The initial test of a group of tests on the subject of series capacitors functioning as automatic voltage regulators has been completed. A report on the test is available upon request.

Shunt Capacitor Application Manual: A manual on the application of shunt capacitors for power factor correction on rural power systems is being prepared.

Standard Substations: Functional specifications are being prepared for substations most commonly used. Upon completion of standard substation designs, it is expected that these designs will appear in the "List Of Materials Acceptable For Use On REA-Financed Systems."

Substation Transformers: Standard specifications are being developed for substation transformers. These will be included in the "List Of Materials Acceptable For Use On REA-Financed Systems."

Thermostatic Controls: A study of the accuracy of the thermostatic controls used on farm and home appliances is in progress.

Voltage Regulators: A manual on the application of step and induction regulators to rural power systems is being prepared.

#### DIVISION'S PARTICIPATION IN WORK OF TECHNICAL STANDARDS COMMITTEES

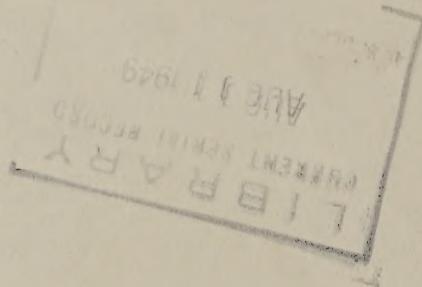
List Of Materials: The Technical Standards Committees on which representatives of the line divisions serve have revised the "List Of Materials Acceptable For Use On REA-Financed Systems." This list has been distributed to REA personnel, system engineers, project managers, supply manufacturers and material distributors. Monthly summaries of changes or additions to the above list, resulting from decisions of the Technical Standards Committees, are being distributed to

the above-mentioned groups. In this way, users of the list can keep their copies up-to-date. This change-list idea is an out-growth of field conferences held last year.

Construction Contract (DS-7R): A procedure has been initiated whereby all drawings accepted by the Technical Standards Committees will be distributed to REA personnel, all cooperatives, system engineers, and safety supervisors, with reasons for new drawings or revisions in existing drawings outlined on the back of the drawings. In this fashion, field personnel will be kept informed of the latest standards.

#### A REQUEST

We ask you members of REA who are in the field to tell us about the technical engineering problems you encounter. We are eager to learn what you want this digest to include. Suggestions for the improvement of this brief report are always welcome. Please address them to Technical Standards Division, REA, Department of Agriculture, Washington 25, D. C.



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**TECHNICAL STANDARDS Digest**

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TO OUR READERS

This brief recapitulation of our operations has for its primary purpose the desire to keep field and headquarters personnel up-to-date on the activities of our Division. The keynote of the digest is to telescope for you the developments pertaining to the Technical Standards Division and to inform you of reports, bulletins, and memoranda that have been issued or are coming out soon. May we stress once again that you can assist us greatly by directing our attention to items which would be helpful in the projects underway in this Division.

HOT OFF THE PRESS

Glossary: A new Glossary of Electrical Terms has been compiled by a Sub-committee on Glossary appointed by the Federal Inter-Agency River Basin Committee of which the Department of Agriculture is a member. It is believed that this Glossary will provide a better understanding of electrical terms used in technical circles and that the abbreviations and terminology contained therein will become standard in the reports, documents, and correspondence of the member agencies. A limited supply of these booklets is available in this Division.

Second Revision of Bulletin No. 10 (Transformer Problems): A supply of these bulletins is expected soon from the Government Printing Office. It is expected that this publication will receive wide distribution. Additional copies will be mailed upon request. The purpose of the issue is to present in condensed form the suggested solution of many problems occurring in transformer operation on rural distribution systems. It contains information regarding the proper connection and fusing of transformers for various types of installations. The report will be valuable as a general handbook for operating personnel on the system. The schools for linemen will find this bulletin useful for training purposes.

OF TIMELY INTEREST

Electric Water Heater Control: Water heater control equipment has been installed recently on

Huntington County REMC (Indiana 74). Initial tests are now underway and preliminary information indicates that there will be improvement in the system load factor with a corresponding reduction in wholesale energy costs. The over-all effectiveness of the equipment is not yet apparent as adjustments are still being made on the load control mechanism.

Electric Water Heater Study: The following are some interesting facts gathered and observations made during this study. Temperatures above 150° F should not be advised for use in most areas unless water softening equipment is used in conjunction with the hot water system. The life of the water heater and the hot water system may be materially reduced if thermostats are set so that heaters will deliver water at temperatures above 150° F. There is a great need for the dissemination of information as to the harmful effects of using furnace coils for supplementing electric water heating. The necessity for assisting consumers in making cost analyses of the installation and operation of hot water systems should also be emphasized. The use of automatic washing machines requires considerable quantities of hot water within relatively short periods of time if consumers desire to complete their weekly washing in a single day. In such cases, larger water heaters are required to meet this special hot water demand. For an entire year, farm water heaters without supplemental heating used 233 kwh per month for heating which represented 45.7 percent of the total consumption.

Automatic Electric Pressure Canner-Cooker: A study of functional specifications for proposed electric pressure cookers and canners was conducted in 1947 in cooperation with various universities and the Agricultural Research Administration, USDA. As a result of this work, a manufacturer developed an automatic electric pressure canner-cooker which is on the market today. Although millions of pressure cookers and canners have been in use, none, up to this time, had been electrically heated or controlled, in regard to both temperature and time.

Series Capacitors As Voltage Regulators: Additional tests on the matter of series capacitors op-

erating as automatic voltage regulators on rural power systems are being made on the Prince William Electric Cooperative, Virginia 41, at Manassas, Virginia.

Single 5 Percent Step Regulators: Initial field tests have been conducted on Wisconsin 25 Monroe. The results appeared favorable and additional tests will be performed during the month of November.

Equipment Performance: Work is being initiated on a project to determine the causes of what appears to be an excessive number of failures of pin type insulators.

Revision of Bulletin No. 4 on Sectionalizing Devices: The purpose of this revision is to bring the information up-to-date with respect to the equipment which has been placed on the market subsequent to the last bulletin.

#### MAINTENANCE

It is apparent that more and more time and effort will have to be expended in the field of maintenance if the systems are to render high quality of service. Also, in view of the fact that the investment in physical equipment on REA-financed systems is approaching one billion dollars, the importance of maintenance is accented further. Several projects that the Division is working on are classified in the category of maintenance.

Oil Circuit Recloser Maintenance Report: This report is ready to be printed. It will describe the recommended procedures to be used for the adequate maintenance of Oil Circuit Reclosers.

Brush Control (Annual Check): Engineers are now on a field survey to determine the effects of chemical spraying of brush which had been done earlier in the season. Many REA-financed systems which must do right-of-way clearing have used chemical sprays on the brush. Information will be made available in the early part of 1950 in a second interim report on brush control by chemical means. The information will include the data on the results of the spraying and important improvements in techniques utilized.

#### PROGRESS ON PROJECTS

Seventeen projects were completed during the year ending June 30, 1949. These projects were concerned with the technical phases of power system design, construction and operation, the applications of electricity in rural areas, and the economic aspects of the use of electricity on farms. Twenty-nine projects are scheduled for completion during the year ending June 30, 1950.

#### DIVISION'S PARTICIPATION IN WORK OF TECHNICAL STANDARDS COMMITTEES

Committee "B" Meetings: Committee "B" reviews all cases which Committee "A" has not accepted and it either accepts or rejects the proposal submitted or standards involved. The Committee conducts such hearings as it considers necessary. During September 1949, Committee "B" held three meetings which is more than had been held in any similar period by the Committee. The acceptance of a proposal by a majority vote of Committee "B" constitutes final acceptance by REA. Unanimous vote of Committee "A" is required for acceptance. Both Committees have a single representative from each of the following divisions: Applications and Loans, Engineering, Management, Power, and Technical Standards.

Transformers for 14.4/24.9 kv Multigrounded Y Distribution Systems: Standards for transformers for this type of system are being presented for decision by Technical Standards Committee "A." Drawings and specifications have been prepared for experimental line construction.

Voltage Regulators: New developments have taken place recently in regard to this type of electrical equipment. Items of equipment which incorporate these new findings have not previously been used on REA-financed systems. These items are now being considered by Technical Standards Committee "A".

Underground and Submarine Cable For Distribution Systems: Planning has been done in the development of specifications for this type of equipment for specialized application on rural power systems. The cable is utilized where airports and river crossings are involved. The specifications will be prepared in the near future.

#### ECHOES FROM THE FIELD CONFERENCES

At the recent field conferences many valuable suggestions were made by field personnel. Among these were expressions of the desirability of obtaining an index of reports and bulletins that have been prepared by the Technical Standards Division. In addition, it was proposed that a list be prepared indicating the types of instruments, from which the borrowers might select those required in their own testing. Action is being taken on these matters and the lists will be forthcoming soon. There was a suggestion made at the conferences that all copies of written material sent from headquarters be three-hole punched on the left side for ready insertion in binders. The above idea has been adopted in this issue of the digest.

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VOL. I NO. 3

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### "OSCARS" TO THE FIELD ENGINEERS

REA borrowers are indebted to field engineers for their alertness and conscientiousness in identifying faulty items of equipment and following up the circumstances under which the equipment became defective. Recently field engineers Hall, Lundeen and Mohler of Region V sent in reports concerning defective hot line clamps, connectors and deadend clamps found on the lines of REA systems. Such collection of valuable data and the subsequent reporting of case histories of this type provide the REA Technical Standards Committees with a basis upon which action may be taken to delete faulty items from the "List of Materials Acceptable For Use On REA-Financed Systems," to revise present specifications for materials, or to initiate new standards. We cannot stress too strongly the fact that we depend, to a large extent, on reports from the field in order to pursue successfully the goal of obtaining improved quality of equipment for all REA systems. We appreciate greatly the efforts of the field engineers and encourage all field personnel to send us detailed reports containing information on any equipment or materials found to be defective or otherwise below standard.

### OF CURRENT INTEREST

Can Single Step Voltage Regulators Be Used To Correct Excessive Voltage Drop? Experimental field tests indicate that this is possible. In general, the maximum number of regulators cascaded on a line should not exceed two. The use of one regulator affords a simple method of correcting excessive voltage drop. The use of two regulators, in cascade, necessitates a more exact determination of the location of both regulators. The test results are conclusive and indicate the possibilities of using single step regulators on rural power systems. An interim report on the initial tests has been written and distributed. Additional copies are available upon request. A final report presenting further details on this subject will be forthcoming soon.

When Is A Motor Not A Motor? Answer - when it's a generator. Ingenuity, the hallmark of successful engineering, has prompted this question

and answer. The potentialities of an induction motor acting as a generator have not been fully developed heretofore. The theory is not new, but the approach is new. A project entitled "Capacitor Excited Induction Generator" has been underway to determine the practicability of using single phase induction motors as standby generators to supply individual farmsteads during power line outages. Preliminary tests on this project are to be conducted in the early part of 1950.

INSULATORS: Data have been received concerning failures of pintype insulators which have taken place at several points. Additional reports by field personnel would be most welcome when they come upon various types of failures. At present, a project is under way regarding the performance of pin type insulators.

OUTAGE MONITOR: An experimental model of a power line outage monitor, previously reported, has been under field test on the lines of Virginia 29 Nelson at Lovingston for the past 18 months. This outage monitoring and reporting system operates on the carrier current principle. The results of the field tests have been so encouraging that the manufacturer is making plans to develop the device for commercial application. The equipment monitors an entire system and indicates at a central point, such as the office, the time and location of an outage. The indication is displayed on a system map by means of red and green signal lamps corresponding to each recloser location. The experimental equipment appears to have a high degree of reliability at moderate cost.

GOSH, ITS HOT! Electric heating has us all steaming. Is the method of electric radiant house heating as good as it is reputed to be? More and more attention is being given to this subject. In time, it may affect the entire rural power system. Judging from the number of requests for information that has been coming forth it appears that this equipment is considered the answer to rural house heating by electricity. However, all facts point to the conclusion that this is not the case. For example, the cost of heating a house with this kind of equipment, assuming that electricity sold for 1-1/2 cents per kwh, would be 2 or 3 times as much as by other methods.

CROP PROCESSING: Requests have been sent to

universities for latest available data concerning methods for processing crops recommended by the various states. Data on all kinds of crops, including hay, grain and other crops, will be assembled and summarized. This information will set forth the ways in which electricity is being utilized in the artificial curing of crops. Crop processing insures a better quality of product year in and year out since the uncertainties of varying weather conditions will be eliminated. A report on this subject will be prepared and distributed.

**ELECTRICAL DEMAND AND DIVERSITY STUDY:** Assistance is being given to the Agricultural Research Administration (BPISAE and BHNHE) in their research to determine the electric demand and diversity of farm and home equipment. Farms have been selected having varying degrees of saturation of electrical devices. Demand metering equipment is being installed on these farms. The project is expected to be going full blast early in 1950. The data acquired will prove valuable in determining the requirements for farmstead wiring, transformer sizes and other demand factors relating to the design and operation of rural power systems.

**THERMOSTATIC CONTROLS:** A report on the operation and application of thermostatic controls used on farm and home appliances has been prepared. It is now being reproduced for distribution. The report includes a general description of the types of thermostats.

#### DIVISION'S PARTICIPATION IN WORK OF REA TECHNICAL STANDARDS COMMITTEES

**RURAL ELECTRIFICATION PROGRAM:** Numerous drawings have been prepared and numerous specifications have been written. Specifications, which incorporate new refinements regarding voltage regulators, have recently been accepted by

REA Technical Standards Committees. Items of equipment containing these new findings have not been utilized heretofore on REA-financed systems. Pole top assembly drawings for transfrmers for 14.4/24.9 kv Multigrounded Y Distribution Systems have been completed and accepted by the Committees and more will be presented, in the near future, to the Committees for acceptance. These types of systems are of great importance since the area coverage objective is gained through them. Equivalent blocks of power are distributed for longer distances at the same voltage drop. Thinner territory can be covered by these types of systems by virtue of their capacity for stretching over longer distances. Other new types of equipment which have been accepted by REA Technical Standards Committee "A" are a Wiring Inspector's Test and an Adequate Wiring Analyzer.

**RURAL TELEPHONE PROGRAM:** Preparation of drawings and specifications on equipment to be utilized in the telephone program is underway. The Division has been on the move from the word, "Go". Preparation of specifications on central office equipment has begun. A number of drawings have been made on outside plant equipment. Specifications are being drawn up for this kind of equipment. The daily output of drawings and specifications of all types is proceeding at a rapid pace.

#### TO OUR READERS

The members of this Division avail themselves of this opportunity to wish everyone of the REA personnel, field and headquarters, a Happy and Prosperous New Year. We wish to remind our field people that we are greatly interested in the technical engineering problems that arise in the field and would like to keep abreast of them through the field reports. We solicit your comments regarding the form and contents of this digest. If we learn the exact type of data needed, this report can prove more valuable to you.

